

Lab 3 - Frame Relay Sub-interfaces

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Lab exercise

Your task is to configure the network in Figure 18–3 to allow full connectivity using frame relay. In order to complete the lab, you will have to use three routers—two as hosts and one as the frame relay router/switch. Configuring a frame relay switch can be a little tricky, but you will never be expected to use this for the CCNA. It is purely for use in a lab environment.

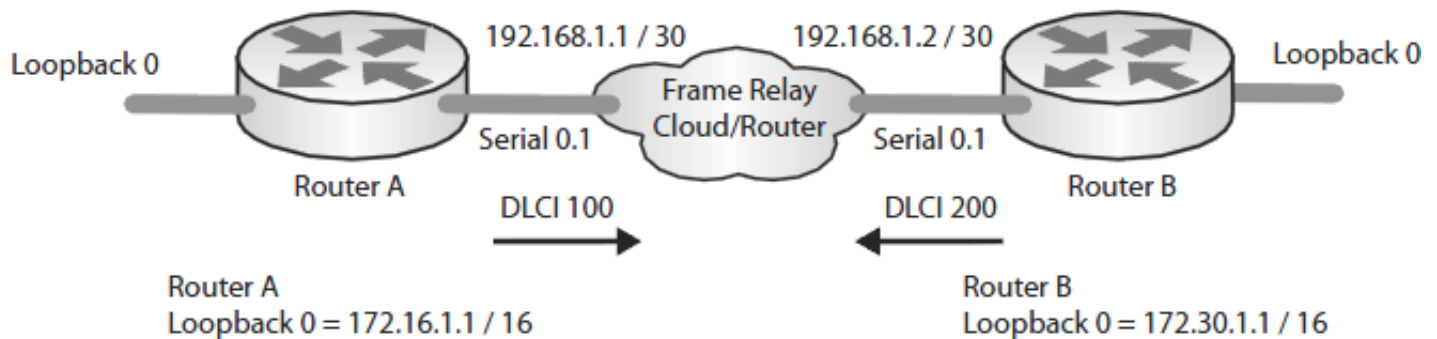


Figure 18–3: Frame relay sub-interfaces

Frame relay sub-interfaces overcome split horizon issues allowing more than one network to be attached to one physical interface. The physical interface can be divided down into one or more sub-interfaces.

Text written in monospaced type indicates commands that can be entered on the router.

Lab objectives

1. Use the IP-addressing scheme depicted in Figure 18–3. The frame switch will have the DCE interfaces so will need to have the clock rate command added.
2. Configure frame relay on the serial interfaces of Routers A and B.
3. Configure the frame relay switch.
4. Configure RIP on Routers A and B to allow for end-to-end connectivity.
5. Test the link by pinging across.

Purpose

Frame relay sub-interfaces are in very common use. Sub-interfaces allow multiple PVCs to terminate on one physical interface. We will only have one PVC per interface in this lab, but you will practice using sub-interfaces.

Lab walk-through

1. Set the IP address and encapsulation type on the routers:

```
Router#config t
Router(config)#hostname RouterA
RouterA(config)#interface serial 0
RouterA(config-if)#encapsulation frame-relay
RouterA(config-if)#no shut
RouterA(config)#interface serial 0.1 point-to-point
RouterA(config-subif)#ip add 192.168.1.1 255.255.255.252
RouterA(config-subif)#frame-relay interface-dlci 100 « You may need
to exit to config-if after this command.
```

```
RouterA(config-fr-dlci)#interface loopback 0 (You may have a different prompt here.)
RouterA(config-if)#ip address 172.16.1.1 255.255.0.0
```

Router B:

```
Router#config t
Router(config)#hostname RouterB
RouterB(config)#interface serial 0
RouterB(config-if)#encapsulation frame-relay
RouterB(config-if)#no shut
RouterB(config-if)#interface serial 0.1 point-to-point
RouterB(config-subif)#ip add 192.168.1.2 255.255.255.252
RouterB(config-subif)#frame-relay interface-dlci 200
RouterB(config-fr-dlci)#interface loopback 0
RouterB(config-if)#ip address 172.30.1.1 255.255.0.0
```

2. We need to configure RIP to allow all networks to see each other.

```
RouterA#config t
RouterA(config)#router rip
RouterA(config-router)#version 2
RouterA(config-router)#network 192.168.1.0
RouterA(config-router)#network 172.16.0.0
```

Router B:

```
RouterB#config t
RouterB(config)#router rip
RouterB(config-router)#version 2
RouterB(config-router)#network 192.168.1.0
```

```
RouterB(config-router)#network 172.30.0.0
```

3. We need to configure the frame relay switch. Just copy the config and change the interface if you are not using the same ones we have here.

```
Router#config t
```

```
Router(config)#hostname FrameSwitch
```

```
FrameSwitch(config)#frame-relay switching (Make the router a frame switch.)
```

```
FrameSwitch(config)#interface serial 0
```

```
FrameSwitch(config-if)#no ip address
```

```
FrameSwitch(config-if)#clock rate 64000
```

```
FrameSwitch(config-if)#encapsulation frame-relay
```

```
FrameSwitch(config-if)#frame-relay intf-type dce (Make the interface DCE.)
```

```
FrameSwitch(config-if)#frame-relay route 100 interface serial 1 200
```

« Send traffic from dlci 100 out of interface serial 0 as dlci 200

```
FrameSwitch(config-if)#no shut
```

```
FrameSwitch(config-if)#interface Serial 1
```

```
FrameSwitch(config-if)#no ip address
```

```
FrameSwitch(config-if)#encapsulation frame-relay
```

```
FrameSwitch(config-if)#frame-relay intf-type dce
```

```
FrameSwitch(config-if)#frame-relay route 200 interface serial 0 100
```

```
FrameSwitch(config-if)#clock rate 64000
```

```
FrameSwitch(config-if)#no shut
```

4. Ping from Router A to the loopback on Router B.

```
RouterA#ping 172.30.1.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 172.30.1.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 60/60/60 ms

```
RouterA#
```

If you cannot ping, then go to the module on troubleshooting.

5. Check for frame relay connectivity.

```
RouterA#show frame-relay map
```

```
Serial0 (up): ip 192.168.1.2 dlci 100(0x64,0x1840), dynamic,  
broadcast, status defined, active
```

```
RouterA#
```

```
RouterA#show frame-relay pvc
```

PVC Statistics for interface Serial0 (Frame Relay DTE)

	Active	Inactive	Deleted	Static
Local	1	0	0	0
Switched	0	0	0	0
Unused	0	0	0	0

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE =
Serial0

```
input pkts 20          output pkts 20          in bytes 1838  
out bytes 1898         dropped pkts 0          in FECN pkts 0  
in BECN pkts 0        out FECN pkts 0        out BECN pkts 0  
in DE pkts 0          out DE pkts 0  
out bcast pkts 10     out bcast bytes 858  
pvc create time 00:07:57, last time pvc status changed 00:03:23
```

```
RouterA#show frame-relay lmi
```

LMI Statistics for interface Serial0 (Frame Relay DTE) LMI TYPE = CISCO

Invalid Unnumbered info 0	Invalid Prot Disc 0
Invalid dummy Call Ref 0	Invalid Msg Type 0
Invalid Status Message 0	Invalid Lock Shift 0

Invalid Information ID 0	Invalid Report IE Len 0
Invalid Report Request 0	Invalid Keep IE Len 0
Num Status Enq. Sent 47	Num Status msgs Rcvd 48
Num Update Status Rcvd 0	Num Status Timeouts 0

RouterA#

RouterA#debug frame-relay lmi

Frame Relay LMI debugging is on

Displaying all Frame Relay LMI data

RouterA#

00:46:38: Serial0(out): StEnq, myseq 53, yourseen 52, DTE up

00:46:38: datagramstart = 0xE3EEA4, datagramsize = 13

00:46:38: FR encap = 0xFCF10309

00:46:38: 00 75 01 01 01 03 02 35 34

00:46:38:

00:46:38: Serial0(in): Status, myseq 53

00:46:38: RT IE 1, length 1, type 1

00:46:38: KA IE 3, length 2, yourseq 53, myseq 53

00:46:48: Serial0(out): StEnq, myseq 54, yourseen 53, DTE up

00:46:48: datagramstart = 0xE3EEA4, datagramsize = 13

00:46:48: FR encap = 0xFCF10309

00:46:48: 00 75 01 01 01 03 02 36 35

00:46:48:

00:46:48: Serial0(in): Status, myseq 54

00:46:48: RT IE 1, length 1, type 1

00:46:48: KA IE 3, length 2, yourseq 54, myseq 54

00:46:58: Serial0(out): StEnq, myseq 55, yourseen 54, DTE up

00:46:58: datagramstart = 0xE3EEA4, datagramsize = 13

00:46:58: FR encap = 0xFCF10309

00:46:58: 00 75 01 01 00 03 02 37 36

00:46:58:

00:46:58: Serial0(in): Status, myseq 55

00:46:58: RT IE 1, length 1, type 0

00:46:58: KA IE 3, length 2, yourseq 55, myseq 55

00:46:58: PVC IE 0x7 , length 0x6 , dlci 100, status 0x2 , bw 0

```
RouterA#un all
```

All possible debugging has been turned off

```
RouterA#
```

```
RouterA#show ip route
```

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

```
C    172.16.0.0/16 is directly connected, Loopback0
```

```
R    172.30.0.0/16 [120/1] via 192.168.1.2, 00:00:12, Serial0
```

192.168.1.0/30 is subnetted, 1 subnets

```
C    192.168.1.0 is directly connected, Serial0
```

```
RouterA#
```

Try all these commands on Router B also.

Show runs

```
RouterA#show run
```

Building configuration...

Current configuration : 781 bytes

!

version 12.1

service timestamps debug uptime

service timestamps log uptime

no service password-encryption

!

hostname RouterA

!

enable secret 5 \$1\$jjQo\$YJXxLo.EZm9t6Sq4UYeCv0

!

username banbury password 0 ccna

!

ip subnet-zero

!

interface Loopback0

ip address 172.16.1.1 255.255.0.0

!

interface Serial0

no ip address

encapsulation frame-relay

!

interface Serial0.1 point-to-point

ip address 192.168.1.1 255.255.255.252

frame-relay interface-dlci 100

!

interface Serial1

no ip address

shutdown

!

interface Ethernet0

no ip address

shutdown

!

interface BRI0

no ip address

shutdown

!

router rip

version 2

network 172.16.0.0

network 192.168.1.0

!

```
ip classless
no ip http server
!
line con 0
line aux 0
line vty 0 4
  login local
!
end
```

RouterA#

RouterB#show run

Building configuration...

Current configuration : 688 bytes

```
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname RouterB
!
ip subnet-zero
!
interface Loopback0
  ip address 172.30.1.1 255.255.0.0
!
interface Serial0
  no ip address
  encapsulation frame-relay
!
```



```
interface Serial0.1 point-to-point
 ip address 192.168.1.2 255.255.255.252
 frame-relay interface-dlci 200
!
interface Serial1
 no ip address
 shutdown
!
interface Ethernet0
 no ip address
 shutdown
!
interface BRI0
 no ip address
 shutdown
!
router rip
 version 2
 network 172.30.0.0
 network 192.168.1.0
!
ip classless
 no ip http server
!
line con 0
line aux 0
line vty 0 4
!
end
```

RouterB#

FrameSwitch#show run

Building configuration...

Current configuration : 685 bytes

```
!  
version 12.1  
service timestamps debug uptime  
service timestamps log uptime  
no service password-encryption  
!  
hostname FrameSwitch  
!  
ip subnet-zero  
!  
frame-relay switching  
!  
interface Ethernet0  
no ip address  
shutdown  
!  
interface Serial0  
no ip address  
encapsulation frame-relay  
clockrate 64000  
frame-relay intf-type dce  
frame-relay route 100 interface Serial1 200  
!  
interface Serial1  
no ip address  
encapsulation frame-relay  
clockrate 64000  
frame-relay intf-type dce  
frame-relay route 200 interface Serial0 100  
!  
interface BRI0  
no ip address
```

```
shutdown
!  
ip classless  
no ip http server  
  
!  
line con 0  
line aux 0  
line vty 0 4  
!  
end  
FrameSwitch#
```



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